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Constellation Energy
R.E. Ginna Nuclear Power Plant

August 31, 2005

U. S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: **R.E. Ginna Nuclear Power Plant**
Docket No. 50-244

Response to NRC Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors" (TAC No. MC4687)

REFERENCES:

(a) NRC Generic Letter 2004-02: Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors

(b) Letter from Mrs. Mary G. Korsnick (Ginna LLC) to Ms. Donna M. Skay (NRC), dated March 7, 2005, 90 Day Response to NRC Generic Letter 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors

The purpose of this letter is to forward R.E. Ginna Nuclear Power Plant, LLC's (Ginna LLC's) response to the Nuclear Regulatory Commission (NRC) Generic Letter 2004-02 (Reference a). The Generic Letter was issued to request evaluation of the Emergency Core Cooling System (ECCS) and Containment Spray System (CSS) recirculation functions and, if appropriate, take additional actions to ensure system function. The request is based on the identified potential susceptibility of pressurized-water reactor (PWR) recirculation sump screens to debris blockage during design basis accidents.

Generic Letter 2004-02 contained two sets of requests for information. The first set of request for information was due to the NRC within 90 days of the date of the Safety Evaluation Report on industry guidance. With the issuance of the Safety Evaluation Report on December 6, 2004, the 90-day response was due by March 7, 2005. The first set of information was provided by Ginna LLC within Reference (b). The second set of request for information is due by September 1, 2005. The purpose of this letter is to provide the response to the second set of request for information and is contained in Attachment 1. A list of regulatory commitments associated with this submittal is provided in Attachment 2.

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Should you have questions regarding the information in this submittal, please contact George Wrobel at (585) 771-3535 or george.wrobel@constellation.com.

Very truly yours,

Mary G. Korsnick

Mary G. Korsnick

STATE OF NEW YORK :
: **TO WIT:**
COUNTY OF WAYNE :

I, Mary G. Korsnick, being duly sworn, state that I am Vice President – R.E. Ginna Nuclear Power Plant, LLC (Ginna LLC), and that I am duly authorized to execute and file this request on behalf of Ginna LLC. To the best of my knowledge and belief, the statements contained in this document are true and correct. To the extent that these statements are not based on my personal knowledge, they are based upon information provided by other Ginna LLC employees and/or consultants. Such information has been reviewed in accordance with company practice and I believe it to be reliable.

Mary G. Korsnick

Subscribed and sworn before me, a Notary Public in and for the State of New York and County of Monroe, this 31 day of August, 2005.

WITNESS my Hand and Notarial Seal:

Sharon L. Miller
Notary Public

SHARON L. MILLER
Notary Public, State of New York
Registration No. 01MI6017755
Monroe County
Commission Expires December 21, 20 06

cc: S. J. Collins, NRC
P. D. Milano, NRC
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ATTACHMENT (1)

RESPONSE TO NRC GENERIC LETTER 2004-02, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY RECIRCULATION DURING DESIGN BASIS ACCIDENTS AT PRESSURIZED-WATER REACTORS"

ATTACHMENT (1)

RESPONSE TO NRC GENERIC LETTER 2004-02, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY RECIRCULATION DURING DESIGN BASIS ACCIDENTS AT PRESSURIZED-WATER REACTORS"

BACKGROUND

Generic Safety Issue (GSI) 191, "Assessment of Debris Accumulation on PWR Sump Performance," was opened by the Nuclear Regulatory Commission (NRC) to assess the possibility that post-accident debris could prevent the ECCS and CSS from performing their intended functions when in the recirculation mode. After the NRC completed its technical assessment of GSI-191, it issued Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors" on June 9, 2003. Bulletin 2003-01 requested a response from PWR licensees on the status of their compliance, on a mechanistic basis, with regulatory requirements concerning the ECCS and CSS recirculation functions. The NRC staff recognized that complex evaluations could be required to determine regulatory compliance, and that the methodology was not available at that time. As a result, that information was not requested in Bulletin 2003-01, but was delayed until a suitable methodology could be developed.

Following development of the methodology, the NRC issued Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," on September 13, 2004. GL 2004-02 requested that PWR licensees perform an evaluation of the effect of in-containment debris on emergency core cooling system (ECCS) and containment spray system (CSS) recirculation functions, and if appropriate, take additional actions to ensure system function. Two written responses were requested. The first response was due 90 days after the Safety Evaluation for the NEI analysis methodology (90-day response) and this, the second response, is due by September 1, 2005.

LICENSING REQUIREMENT

In GL 2004-02, the NRC states that, in accordance with 10 CFR 50.54(f), the PWR addressees are required to submit written responses to GL 2004-02. The information is sought to verify licensees' compliance with the regulatory requirements listed in the "Applicable Regulatory Requirements" section of GL 2004-02. The information requested by the NRC and the written responses to these requests are provided in Section 3.

RESPONSE

NRC Requested Information:
Addressees: are requested to provide the following information no later than September 1, 2005

NRC REQUEST 2(a)

NRC Requested Information
"Confirmation that the ECCS and CSS recirculation functions under debris loading conditions are or will be in compliance with the regulatory requirements listed in the Applicable Regulatory Requirements section of this generic letter. This submittal should address the configuration of the plant that will exist once all modifications required for regulatory compliance have been made and this licensing basis has been updated to reflect the results of the analysis described above".

Ginna LLC Response

Actions will be implemented to ensure that the ECCS and CSS recirculation functions under debris loading conditions will be in compliance with the regulatory requirements listed in the Applicable Regulatory Requirements section of NRC Generic Letter 2004-02 when all modifications are completed. The debris load has been identified and the design of a replacement sump strainer to meet these new requirements has been initiated. The replacement strainer will be redundant active strainers, designed by General Electric, which will keep a sufficient portion of the flow area clean at all times. The configuration of the plant that will exist once all modifications required for regulatory compliance are completed is addressed in responses 2(b) through 2(f) below.

NRC REQUEST 2(b)

NRC Requested Information

"A general description of and implementation schedule for all corrective actions, including any plant modifications, that you identified while responding to this generic letter. Efforts to implement the identified actions should be initiated no later than the first refueling outage starting after April 1, 2006. All actions should be completed by December 31, 2007. Provide justification for not implementing the identified actions during the first refueling outage starting after April 1, 2006. If all corrective actions will not be completed by December 31, 2007, describe how the regulatory requirements discussed in the Applicable Regulatory Requirements section will be met until the corrective actions are completed".

Ginna LLC Response

Ginna LLC plans to modify the existing sump debris screens with new General Electric active self-cleaning strainers that ensure acceptable net positive suction head (NPSH) for the ECCS pumps under worst case debris loading scenarios. Installation is planned for the refueling outage RFO 032 in the fall of 2006. All modifications are scheduled to be completed prior to December 31, 2007.

NRC REQUEST 2(c):

NRC Requested Information

"A description of the methodology that was used to perform the analysis of the susceptibility of the ECCS and CSS recirculation functions to the adverse effects of post- accident debris blockage and operation with debris-laden fluids. The submittal may reference a guidance document (e.g., Regulatory Guide 1.82, Rev. 3, industry guidance) or other methodology previously submitted to the NRC. (The submittal may also reference the response to Item 1 of the Requested Information described above. The documents to be submitted or referenced should include the results of any supporting containment walkdown surveillance performed to identify potential debris sources and other pertinent containment characteristics.)"

Ginna LLC Response

Walkdown Surveillances

The methodology of NEI 02-01 (Reference 4) was used as guidance for walkdown surveillances. The results of the walkdown surveillances were used to validate the insulation inventory in containment, recirculation flow paths, and potential chokepoints that were used in the debris generation and debris transport analyses.

Debris Generation Methodology

The methodologies of NEI 04-07 (Reference 3) were used to determine the types, quantities, and locations of debris generated during a LOCA event in which the plant enters the recirculation mode.

The specific break locations were selected to maximize the debris load, consistent with the methodology of NEI 04-07.

Debris from qualified coatings was determined using the approach described in NEI 04-07. The surface area of the spherical zone of influence (ZOI) was determined for qualified coatings, and this area is multiplied by the associated thickness. The qualified coatings inside the ZOI are assumed to fail to fines. Outside the ZOI, qualified coatings are assumed to remain intact.

Although Ginna is not required to track unqualified coatings as part of our design basis, we have concluded that our specification to use only qualified coatings in containment, combined with testing that has been performed on existing paint in containment and the additional margin added to the debris load for potentially failed coatings provides reasonable assurance that minimal quantities of unqualified coatings that may exist in containment would not inhibit the capability of the ECCS.

The debris size distribution for debris source materials was determined using the approach outlined in NEI 04-07.

The debris spatial distribution was determined using logic trees consistent with the approach outlined in NEI 04-07. Debris transport is analyzed using the Computational Fluid Dynamics (CFD) based methodology outlined in NEI 04-07. A three dimensional solid model of the containment floor was generated that included all pertinent features from the floor to the water surface at the start of recirculation.

Chemical Effects

Although the active strainer prevents the formation of chemical precipitants on the strainer surface being cleaned by the patented design of the plow and comb, sufficient margin above the debris load will be demonstrated through strainer qualification.

Downstream Effects

The methodologies of NEI 04-07 and WCAP-16406-P (Reference 6) will be used to evaluate the downstream effects of debris that is passed by the sump screen. Consistent with the guidance in NEI 04-07, the evaluation will consider debris that is 15% larger than the largest dimension of the sump screen opening.

Analyses Performed By Contractors
The Computational Fluid Dynamics (CFD) model, refined debris generation and transport analyses were performed by Alion Science and Technology.

NRC REQUEST 2(d)

NRC Requested Information
"The submittal should include, at a minimum, the following information:"

This information request is divided into eight (8) sections; each section is addressed separately.

NRC REQUEST 2(d)i

NRC Requested Information
"The minimum available NPSH margin for the ECCS and CSS pumps with an unblocked sump screen".

Ginna LLC Response
The only pumps that take suction from the containment sump are the residual heat removal (RHR) pumps. The response to GL 97-04 (Reference 7) indicated that the post-accident recirculation phase represented the limiting set of results and that in all cases analyzed, the available NPSH is greater than the required NPSH. The minimum available NPSH margin for the Residual Heat Removal pumps is currently 1.05 feet.

The most limiting case for containment spray NPSH margin occurs during the injection phase prior to transferring to the recirculation phase. The minimum available NPSH margin for the CSS pumps at that time is 5.5 feet. No credit is taken for CSS under the current design bases in the sump recirculation phase. Conditions under which a CSS pump may be required by Emergency Operating Procedures for beyond design basis conditions demonstrate sufficient NPSH margin is available since the spray pump receives its suction from the discharge of the RHR pumps.

NRC REQUEST 2(d)ii

NRC Requested Information
"The submerged area of the sump screen at this time and the percent of submergence of the sump screen (i.e., partial or full) at the time of the switchover to sump recirculation."

Ginna LLC Response

Ginna LLC is currently working with GE to size the active strainers through testing activities. As previously reported to the NRC (Reference 5), testing of the strainer design will be performed by the vendor. Following the active strainer testing the required submerged area of the sump screen at Time of Minimum NPSH (Unblocked Sump Screens) will be determined. The percent of submergence of the sump screen at sump recirculation switchover will be 100%.

NRC REQUEST 2(d)iii

NRC Requested Information

"The maximum head loss postulated from debris accumulation on the submerged sump screen, and a description of the primary constituents of the debris bed that result in this head loss. In addition to debris generated by jet forces from the pipe rupture, debris created by the resulting containment environment (thermal and chemical) and CSS washdown should be considered in the analyses. Examples of this type of debris are disbonded coatings in the form of chips and particulates and chemical precipitants caused by chemical reactions in the pool..."

Ginna LLC Response

As previously reported to the NRC (Reference 5), testing of the strainer design will be performed by the vendor. One of the design criteria Ginna LLC has established with the vendor of the self cleaning strainer is a 0.5 feet maximum postulated head loss from debris accumulation on the submerged sump screen. Also, the active strainer prevents the formation of chemical precipitants on the strainer surface being cleaned by the plow and comb.

The primary constituents of the debris bed determined from the Debris Generation and Transport calculations are provided in the table below.

Description of the primary constituents of the debris bed.	Ginna Response
Stainless Steel Reflective metal Insulation	712.9 ft^2
CalSil/Asbestos	63.4 ft^3
Asbestos	6.1 ft^3
Fiber Insulation – Temp-Mat™	27.1 ft^3
Fiber Insulation – Thermal Wrap	202 ft^3
Phenolic Paint	1158 lb
Inorganic Zinc Paint	151.8 lb
Latent Debris– Latent fiber	5.4 lb
Latent Particulate Dirt & Dust	159.8 lb

NRC REQUEST 2(d)iv

NRC Requested Information

"The basis for concluding that the water inventory required to ensure adequate ECCS or CSS recirculation would not be held up or diverted by debris blockage at choke-points in containment recirculation sump return flowpaths".

Ginna LLC Response

Adequate NPSH (available) is obtained with the existing Refueling Water Storage Tank inventory; thus no modifications or procedural changes for water inventory will be required. Containment walkdowns confirmed that there are no choke points for the recirculation flow inside containment that would prevent adequate water inventory from reaching the containment sump screens.

Additionally, an inspection for non-LOCA generated material that could potentially obstruct recirculating water is conducted as part the containment cleanliness inspection program prior to restart following a refueling outage. The controlling procedure specifically addresses the need to assure that the containment is free of loose debris or fibrous material, and items not approved for storage in containment are removed.

NRC REQUEST 2(d)v

NRC Requested Information

"The basis for concluding that inadequate core or containment cooling would not result due to debris blockage at flow restrictions in the ECCS and CSS flowpaths downstream of the sump screen, (e.g., a HPSI throttle valve, pump bearings and seals, fuel assembly inlet debris screen, or containment spray nozzles). The discussion should consider the adequacy of the sump screen's mesh spacing and state the basis for concluding that adverse gaps or breaches are not present on the screen surface".

Ginna LLC Response

As part of the design evaluation of the replacement sump strainer, Ginna LLC will also document that the replacement strainer adequately maintains the functionality of the Emergency Core Cooling System/Reactor Coolant System downstream components. To determine the bypass flow from the active strainer, as previously reported to the NRC (Reference 5), a flow test will be performed by the vendor. No flow blockages are anticipated in the recirculation flow path since the other components have already been found acceptable for a screen opening of 3/16" x 9/16" and the new screen opening will have no opening greater than 0.125". While no downstream flow blockage is conceivable, Ginna LLC will nonetheless document this conclusion in an evaluation following the guidance contained in the Westinghouse Owners Group WCAP 16406-P on evaluating downstream effects.

Since the active strainers will always have a portion of the flow area clean there will only be a relatively small differential pressure across the screen. The sump screen design requirements ensure that it will be capable of withstanding calculated differential pressures and debris loads, as well as seismic loads, without developing gaps or breaches.

NRC REQUEST 2(d)vi

NRC Requested Information

"Verification that close-tolerance subcomponents in pumps, valves and other ECCS and CSS components are not susceptible to plugging or excessive wear due to extended post-accident operation with debris-laden fluids".

Ginna LLC Response

As previously reported to the NRC (Reference 5), Ginna LLC has a schedule to address the effects of the debris-laden fluid which passes through the sump strainer. This will consist of following the guidance contained in the Westinghouse Owners Group WCAP 16406-P on evaluating downstream effects using the strainer bypass flow characterization to be determined through testing. Based on preliminary discussions with component vendors no problems are anticipated.

NRC REQUEST 2(d)vii

NRC Requested Information

"Verification that the strength of the trash racks is adequate to protect the debris screens from missiles and other large debris. The submittal should also provide verification that the trash racks and sump screens are capable of withstanding the loads imposed by expanding jets, missiles, the accumulation of debris, and pressure differentials caused by post-LOCA blockage under predicted flow conditions".

Ginna LLC Response

The asymmetric blowdown loads resulting from double-ended pipe breaks in the primary system piping need not be considered (References 8, 9, 10, 11) as a design basis for Ginna, and therefore Leak-Before-Break (LBB) methodology will be applied for the primary system piping for which LBB methodology has been approved. This LBB provision will be invoked under the containment sump modification so that the replacement sump strainers do not need protection from the dynamic effects of a break in this piping.

Additionally, since the active strainers will always have a portion of the flow area clean there will only be a relatively small differential pressure across the screen. The sump screen design requirements ensure that it will be capable of withstanding calculated differential pressures and debris loads, as well as seismic loads, without developing gaps or breaches.

NRC REQUEST 2(d)viii

NRC Requested Information

"If an active approach (e.g., backflushing, powered screens) is selected in lieu of or in addition to a passive approach to mitigate the effects of the debris blockage, describe the approach and associated analyses".

Ginna LLC Response

Ginna has elected to install an active strainer. The device selected is General Electric's Plow & Comb strainer design. This device will continuously clean a portion of the strainer surface so that regardless of the debris load at the strainer there will always be a clean portion of surface area to allow flow to the pumps taking suction from the containment sump. The size of the area cleaned is based on that required to maintain the strainer headloss to within desired values. Two Plow & Comb devices will be installed to allow for single-failure protection.

To support the design and qualification of this device General Electric shall perform strainer headloss testing to verify that under the maximum debris loading rate the strainer headloss is maintained within specified values. General Electric will also provide verification that these results are applicable to two units operating side-by-side. During this testing the flow that passes through the strainer (referred to as bypass flow) will be collected for use in testing to support downstream effects evaluations.

In the qualification of the strainer, Ginna and General Electric will demonstrate sufficient margin above the debris loads obtained from the containment walkdowns to ensure that potential changes in debris loads are adequately bounded.

NRC REQUEST 2(e)

NRC Requested Information

"A general description of and planned schedule for any changes to the plant licensing bases resulting from any analysis or plant modifications made to ensure compliance with the regulatory requirements listed in the Applicable Regulatory Requirements section of this generic letter. Any licensing actions or exemption requests needed to support changes to the plant licensing basis should be included".

Ginna LLC Response

Ginna intends to address the effects of post-LOCA debris generation described in Generic Letter 2004-02 by modifications of plant equipment in a manner that will comply with the current technical specifications and licensing basis of the plant. Accordingly, at this time, in support of the planned modification to the containment sump a new surveillance requirement will be added to Technical Specifications to verify that each Containment Sump Strainer Cleaner starts on a manual actuation signal. This surveillance will be performed on a 24 month frequency. No other Technical Specification changes are currently expected. Ginna LLC will submit the License amendment request for the additional Technical Specification Surveillance Requirement by July 1, 2006.

The plant modification to install the new active strainers will be reviewed in accordance with 10 CFR 50.59 provisions. At this time, it is not expected that a License Amendment will be required as a result of this review.

NRC REQUEST 2(f)

NRC Request 2.(f):
"A description of the existing or planned programmatic controls that will ensure that potential sources of debris introduced into containment (e.g., insulations, signs, coatings, and foreign materials) will be assessed for potential adverse effects on the ECCS and CSS recirculation functions. Addressees may reference their responses to GL 98-04, "Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System after Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment," to the extent that their responses address these specific foreign material control issues".

Ginna LLC Response

It is currently planned to add a requirement to the review checklists for plant modifications that potential sources of debris, such as insulation, be assessed for possible adverse effects on the ECCS recirculation functions.

Ginna procedures currently require that in preparation for a plant startup, Containment closeout inspections be conducted. This includes explicit instructions for the identification and removal of foreign materials including trash and debris inside all areas of Containment. Included in these procedures are particular instructions for inspecting and cleaning the lowest level of Containment to ensure no debris exists inside the emergency sump and on the screening of the emergency sump.

Ginna LLC conducts condition assessments of Service Level I coatings inside Containment every refueling outage. Generally, all of the accessible areas within Containment are visually inspected. As localized areas of degraded coatings are identified, those areas are evaluated and scheduled for repair or replacement as necessary. The periodic condition assessments and the resulting repair/replacement activities assure that the amount of Service level I coatings outside of the zone of influence that may be susceptible to detachment from the substrate during a LOCA is minimized. Although Ginna is not required to track unqualified coatings as part of our design basis, we have concluded that our specification to use only qualified coatings in containment, combined with testing that has been performed on existing paint in containment and the additional margin added to the debris load for failed coatings provides reasonable assurance that minimal quantities of unqualified coatings that may exist in containment would not inhibit the capability of the ECCS.

REFERENCES

1. Letter from Mrs. Mary G. Korsnick (Ginna LLC) to Ms. Donna M. Skay (NRC), dated March 7, 2005, 90 Day Response to NRC Generic Letter 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors.
2. Letter from Ms. Donna Skay (NRC) to Mrs. Mary G. Korsnick (Ginna LLC), dated June 2, 2005, R.E. Ginna Nuclear Power Plant – Request for Additional Information (RAI) Related to Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Sump Recirculation during Design Basis Accidents at Pressurized-Water Reactors".
3. NEI-04-07, Pressurized-Water Reactor (PWR) Sump Performance Methodology, dated May 28, 2004.
4. NEI-02-01, Condition Assessment Guidelines, Debris Sources inside Containment, Revision 1.
5. Letter from Mrs. Mary G. Korsnick (Ginna LLC) to Document Control Desk (NRC), dated July 15, 2005, 90 Day Response to NRC Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors".
6. WCAP-16406-P, Evaluation of Downstream Sump Debris Effects in Support of GSI-191
7. Letter from Mr. Robert Mecredy (RG&E) to Document Control Desk (NRC), dated January 6, 1998, Response to Generic Letter 97-04, R.E. Ginna Nuclear Power Plant.
8. Letter from D. M. Crutchfield, NRC, to J. E. Maier, RG&E, dated June 28, 1983, IPSAR Section 4.13, Effects of Pipe Break on Structures, Systems, and Components Inside Containment for the R. E. Ginna Nuclear Power Plant.
9. Letter from Dominic C. DiIanni, NRC, to R. W. Kober, RG&E, September 9, 1986, Generic Letter 84-04.
10. Letter from G. Vissing, NRC, to R. Mecredy, RG&E, February 25, 1999, Staff Review of the Submittal By RG&E to Apply Leak - Before - Break Status to Portions of the RHR System Piping.
11. Letter from J. Widay (Ginna LLC) to R. Clark (NRC), dated September 30, 2004, Fracture Mechanics Analysis per GDC-4.

ATTACHMENT (2)

REGULATORY COMMITMENTS

REGULATORY COMMITMENT	DUE DATE
Complete the installation of an active strainer system to support closure of GL 2004-02.	Prior to December 31, 2007.
Complete vendor testing of the active strainer system and the associated downstream affects evaluation.	Prior to May 1, 2006.
Submit a Technical Specification amendment request to add a surveillance requirement to verify each Containment Sump Strainer Cleaner starts on a manual actuation signal.	Prior to July 1, 2006.
Add a requirement to the review checklists for plant modifications that potential sources of debris, such as insulation, be assessed for possible adverse effects on the ECCS recirculation functions	Prior to December 31, 2005.